Topic D:

**Using Functions and Graphs to Solve Problems**

A-CED.A.1, A-SSE.B.3c, F-IF.B.4, F-IF.B.6, F-IF.C.9, F-BF.A.1a, F-LE.A.2, F-LE.B.5

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| Focus Standard: | A-CED.A.1 | Create equations and inequalities in one variable and use them to solve problems. *Include equations arising from linear and quadratic functions, and simple rational and exponential functions*.★ |
|  | A-SSE.B.3c | Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.★   1. Use the properties of exponents to transform expressions for exponential functions. *For example the expression can be rewritten as to reveal the approximate equivalent monthly interest rate if the annual rate is* |
|  | F-FI.B.4 | For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. *Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity*.★ |
|  | F-IF.B.6 | Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.★ |
|  | F-IF.C.9 | Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). *For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.* |
|  | F-BF.A.1a | Write a function that describes a relationship between two quantities.★   1. Determine an explicit expression, a recursive process, or steps for calculation from a context. |
|  | F-LE.A.2 | Construct linear and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).★ |
|  | F-LE.B.5 | Interpret the parameters in a linear or exponential function in terms of a context.★ |
| Instructional Days: | 4 |  |
| Lesson 21: | Comparing Linear and Exponential Models Again | |
| Lesson 22: | Modeling an Invasive Species Population | |
| Lesson 23: | Newton’s Law of Cooling | |
| Lesson 24: | Piecewise and Step Functions in Context | |

In Topic D, students explore application of functions in real world context and use exponential, linear and/or piecewise functions and their associated graphs to model the situations. The contexts include the population of an invasive species, applications of Newton’s Law of Cooling, and long-term parking rates at the Albany International Airport. Students are given tabular data and/or verbal descriptions of a situation and create equations and/or scatterplots of the data. They use continuous curves fit to population data to estimate average rate of change and make predictions about future population sizes. They write functions to model temperature over time, graph the functions they have written, and use the graphs to answer questions within the context of the problem. They recognize when one function is a transformation of another within a context involving cooling substances.